CompassData

Complete Global Coverage

THE WORLD'S LARGEST COMERCIALLY AVAILABLE COMPREHENSIVE GROUND CONTROL POINT DATA SET.

WE ARE CONTROL FREAKS

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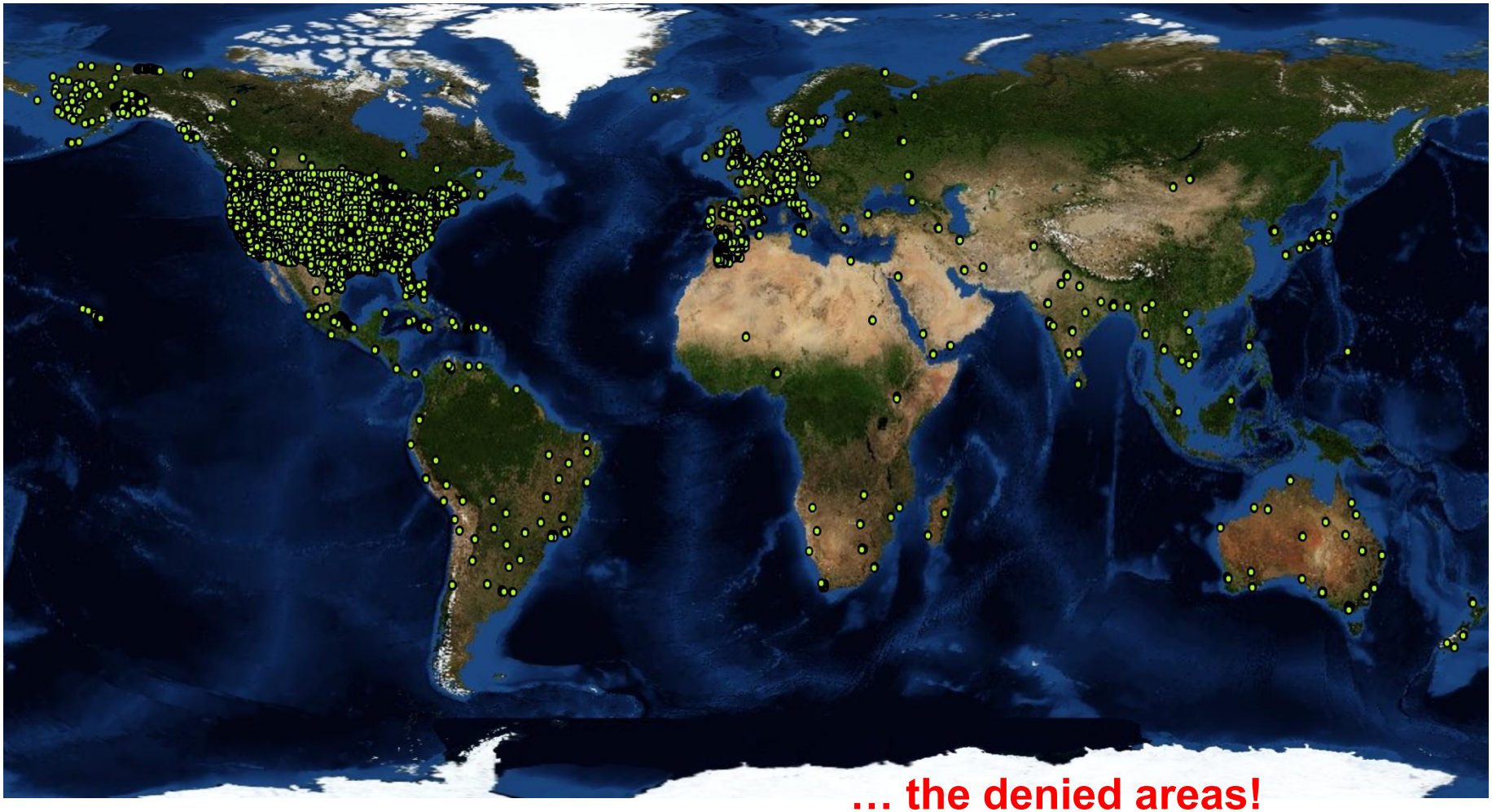
Remotely Sensed Ground Control

W. Brant Howard
Founder & CEO

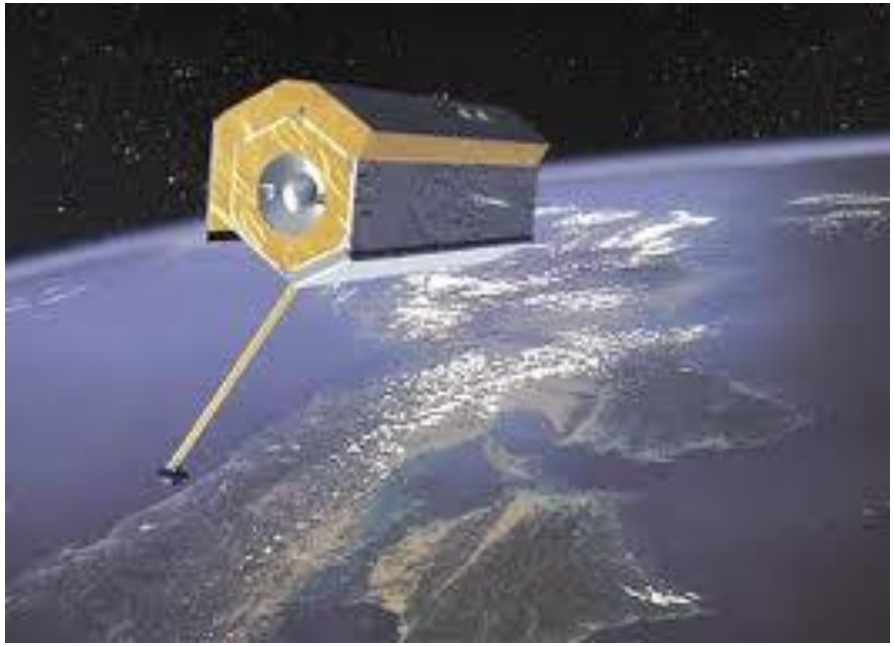
Approximately 18,000 photo identifiable Ground Control Points off the shelf and growing into…



Options

Terrestrial GCP

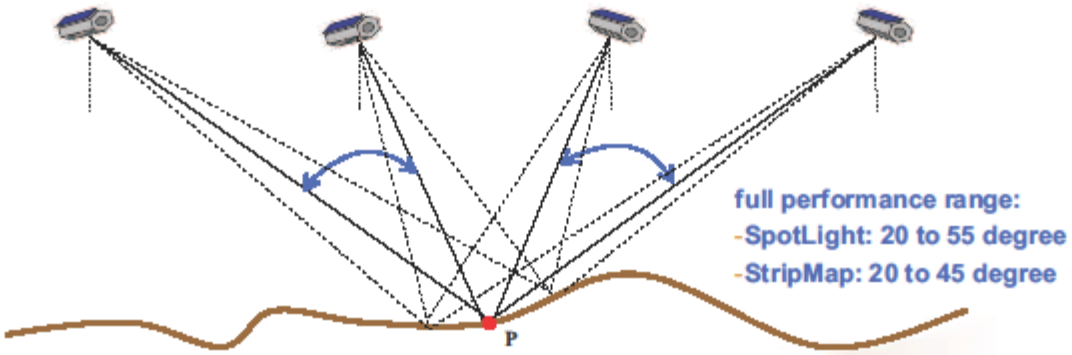
Remotely Sensed GCP
RSGCP™



TerraSAR-X Background

- TerraSAR-X capabilities: High resolution, multi-beam image acquisition
- Along with the image data, detailed and very precise metadata are provided
- Image position error of 0.3 m in range and 0.5 m in azimuth is proven

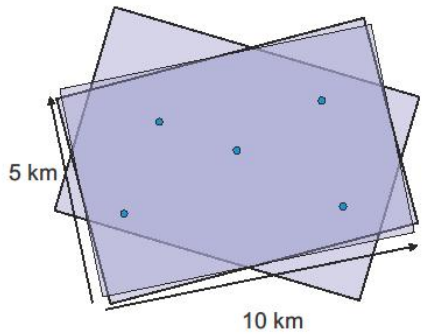
- → high accurate 3D information extraction using stereo or multiple image data sets



Multi-beam imaging scheme of TerraSAR-X (Ascending and Descending)

ASTRIUM

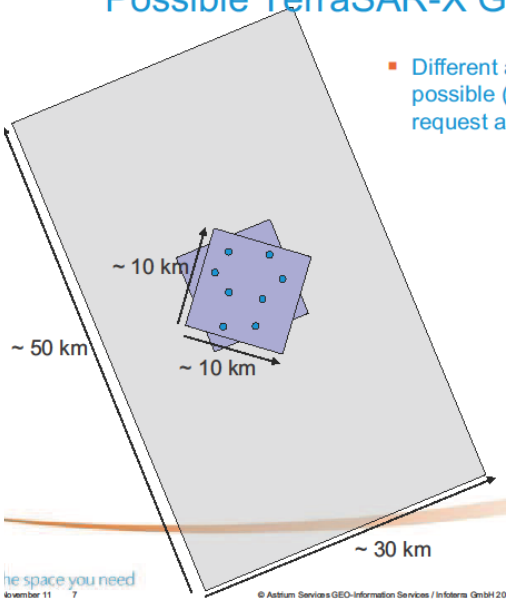
Possible TerraSAR-X GCP-1 AOI



ASTRIUM

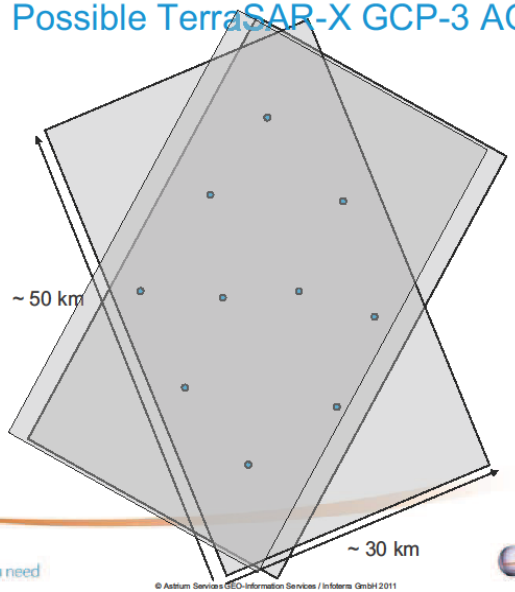
Possible TerraSAR-X GCP-2 AOI

- Different acquisition constellations possible (depending on customer request and scene availability)



ASTRIUM

Possible TerraSAR-X GCP-3 AOI



ASTRIUM

TerraSAR-X GCP delivery package

- Using stereo or multiple image data sets lead to high accurate 3D information extraction
  - GCP-1 accuracy: based on min. 3 HS scenes, up to 5 GCPs with up to 1m accuracy in an area of 20 km²
  - GCP-2 accuracy: based on min. 3 scenes (SM and SL), up to 8 GCPs within up to 2m accuracy in an area up to 100 km²
  - GCP-3 accuracy: based on min. 3 SM acquisitions, up to 10 GCPs with up to 3m accuracy in an area up to 1000 km²
- Delivery with a comprehensive package typically within 4 weeks after order confirmation
  - X, Y, Z coordinates of the GCPs,
  - Radar image chip of the surroundings (500x500m area),
  - Verbal description of each GCP and
  - Compressive statistics
  - A corresponding .kml-file

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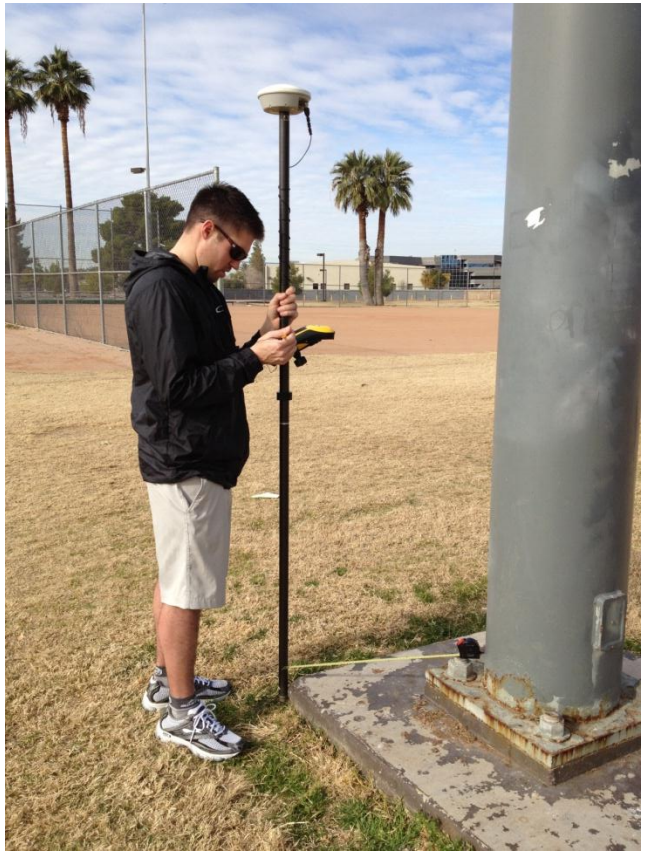
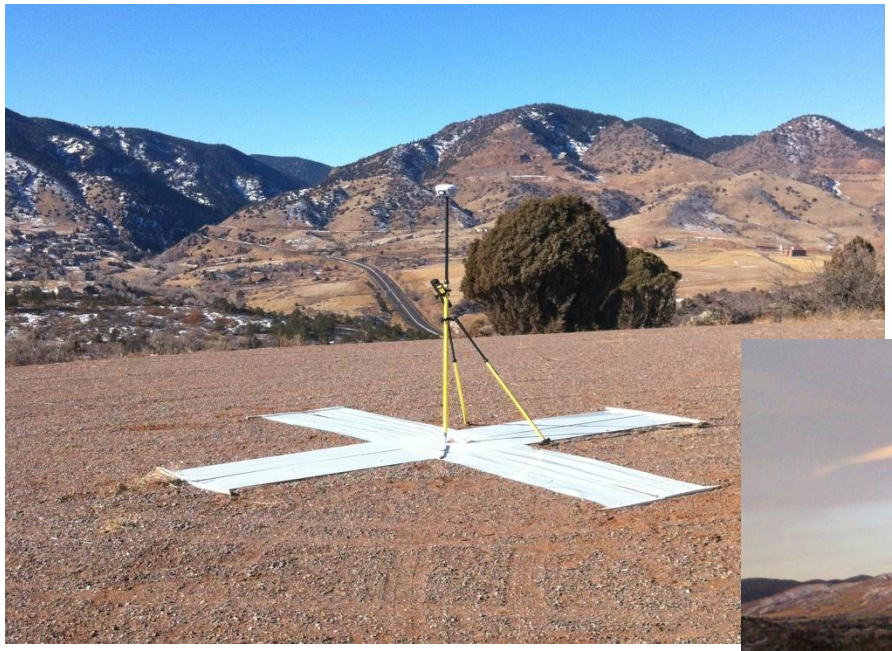
To ensure accuracy of the RSGCPs; field tests were performed in:

Morrison, CO: RSGCP-1
Phoenix, AZ: RSGCP-2 and 3
Centennial Airport, CO: RSGCP-3



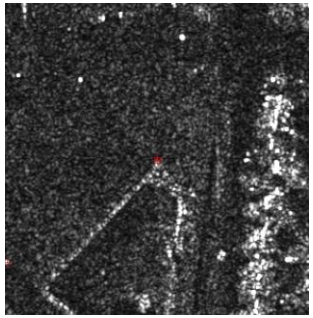
RSGCP Accuracy Field Testing



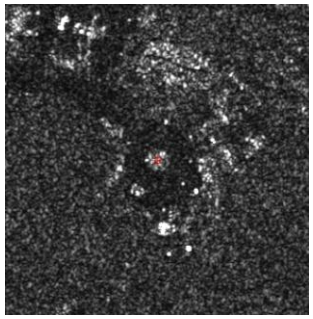
GPS Observation

The perfect RADAR reflector

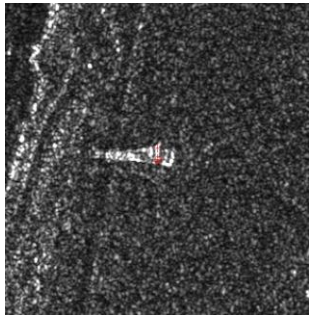
What features are visible in the TerraSAR-X data?




Example 1: Coarseness differences

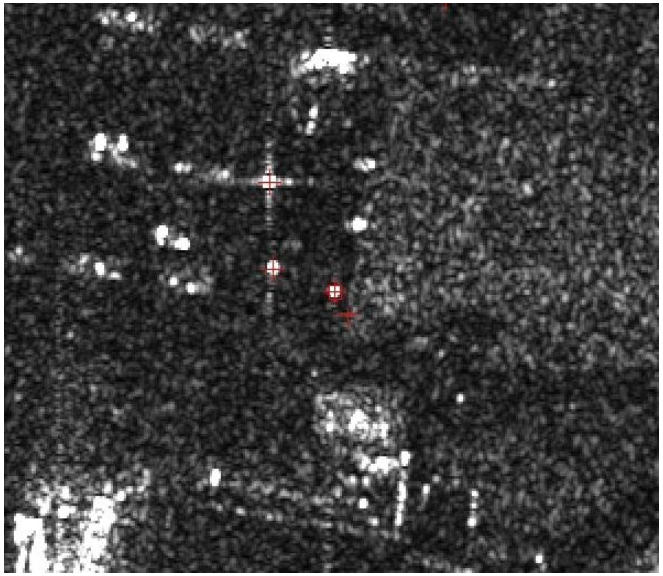



Example 2: Coarseness differences and strong reflectors




Example 3: Strong reflectors (permanent scatterers)

The perfect reflectors cause a very high and concentrated signal in the SAR images.

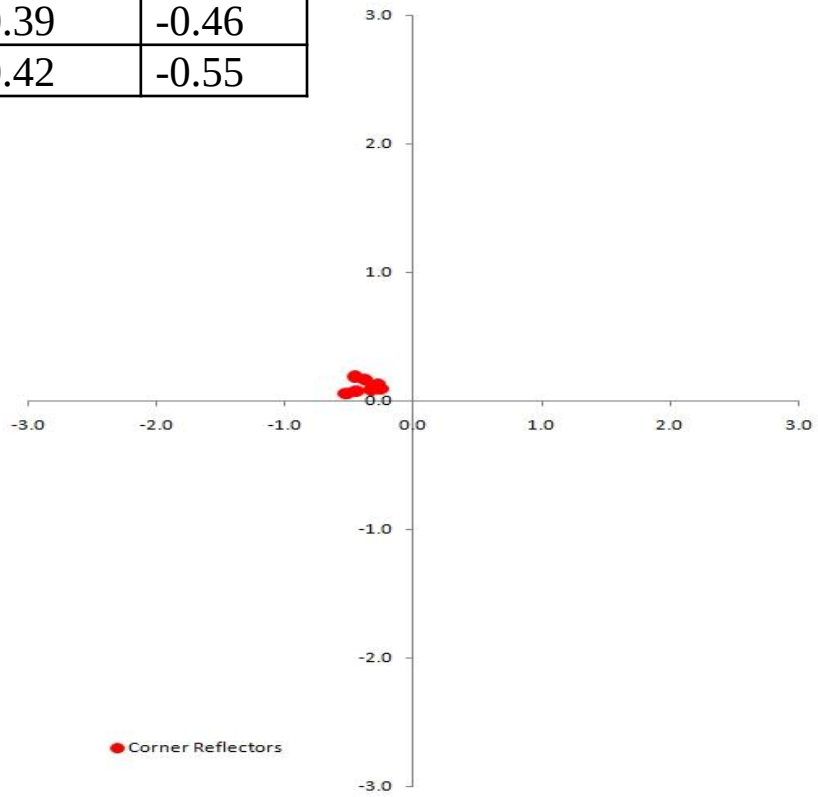


1 large reflector
2 small reflectors
Many poles

Tetherball-poles and the random small reflectors.

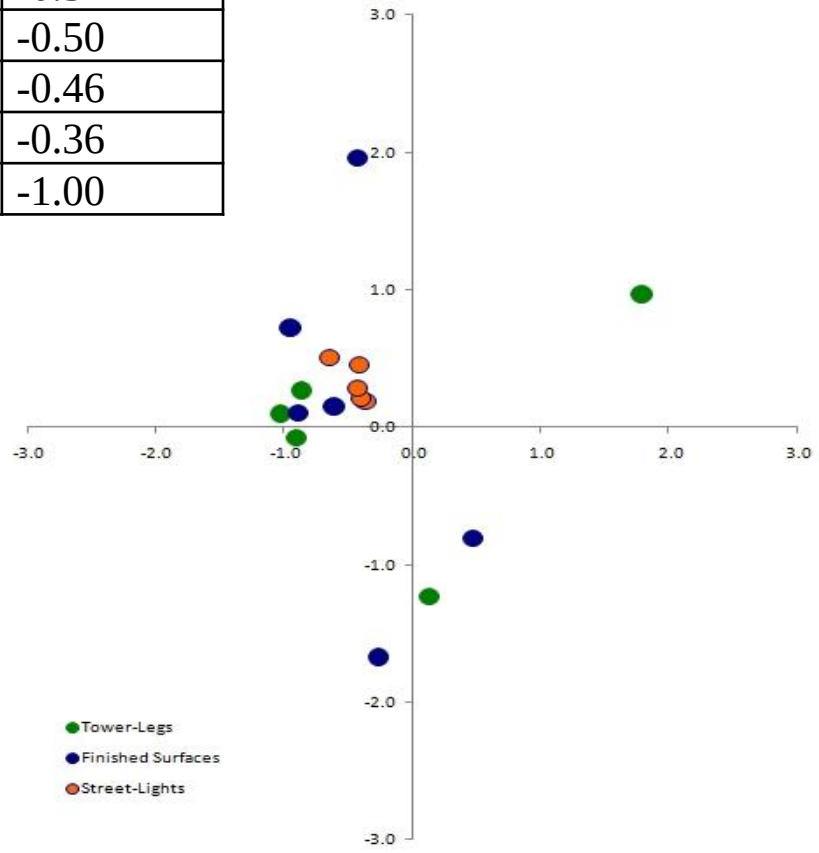
Comparison of ‘perfect’ corner-reflectors versus ground GPS measurements (in Meters):

Object description	Amount	Hmax	Vmax	Hmean	Vmean
Large aluminum reflectors	4	0.53	-0.46	0.39	-0.46
Small metal reflectors	3	0.54	-0.62	0.42	-0.55



Comparison of real features versus ground GPS measurements (in Meters):

Features	Amount	HMax	VMax	HMean	VMean
Steel light-poles	5	0.82	-0.59	0.56	-0.37
Electric tower-leg	5	2.04	-0.88	1.22	-0.50
Finished surfaces	6	2.01	-0.65	1.11	-0.46
Traffic islands	2	1.22	-0.60	0.93	-0.36
Boulder	1	1.31	-1.00	1.31	-1.00



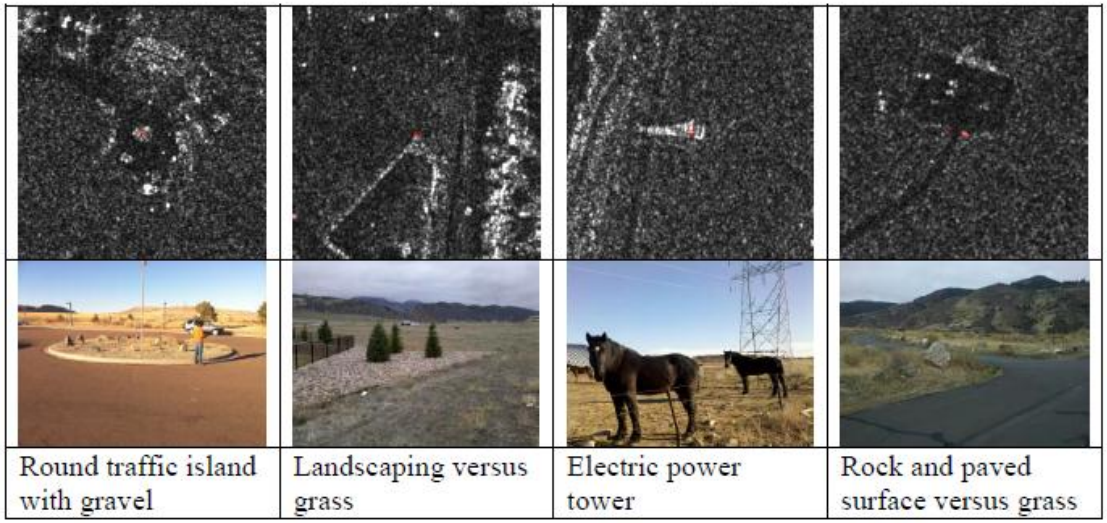
THE RIGHT CHOICE OF FEATURE PROVIDES THE OPTIMAL RESULT

The research showed that the right choice for a feature is the key for an optimal RSGCP result. The feature must fulfill two different requirements:

• First, the feature has to be identifiable in the multi-spectral or panchromatic scene of an optical sensor.

• Second, the feature must be identifiable in the radiometric imagery.

Therefore, the feature must possess a distinct reflectivity within its surrounding.



Round traffic island with gravel	Landscaping versus grass	Electric power tower	Rock and paved surface versus grass

Results

- Elevations have a very constant accuracy without any outlier
- The effort on the horizontal component has to be greater, especially for a flat feature defined by a change in coarseness
- Loose gravel or dirt usually collects on the edges and borders along finished surfaces due to wind and rain. A minor amount could impact the radiometric image, but might not even be visible in the optical image, causing an unwanted offset
- Vertical standing metal poles, if available and if visible in the optical image, are better
- Alternatively to using a single pole as a point-feature is the base of the steel towers for power-lines, which are often visible in optical imagery

- **The test results show a horizontal accuracy of 1.0 m and a vertical accuracy of 0.5 m. A closer look at these accuracies show horizontal and vertical systematic shifts of approximately 0.5 m. Therefore the relative accuracy is within a few decimeters.**

Opportunities

- 1m to 3m control anywhere on the Planet
- Fill in the gaps to build a seamless image coverage of the Globe
- Provide control to enhance elevation models
- Check points for QA and Calibration


Thank You?